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ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

Early Field Survival of Bare-Root, Container-Grown, and Potted Ponderosa Pine Seedlings in South-Central Nebraska

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Two trials in south-central Nebraska indicate no significant differences in survival of bare-root versus container-grown or potted seedlings. Container-grown seedlings grew faster than bare-root stock after establishment.

Keywords: Container-grown seedlings, shelterbelts, *Pinus ponderosa*.

Among the conifers, ponderosa pine (*Pinus ponderosa* var. *scopulorum*) is second only to eastern redcedar (*Juniperus virginiana* L.) in numbers planted in Nebraska. Until recently, virtually all seedlings distributed in the Nebraska Clarke-McNary program were nursery-grown, bare-root (2+0 or 2+1) stock. However, initial survival has been erratic. Thus potted and container-grown seedlings, though initially more expensive, have been planted in recent attempts to improve survival. Comparisons have indicated that container-grown stock survived better than bare-root stock in the Northern Plains (Hite 1974, Tinus 1976). This Note reports trials of bare-root versus container-grown and bare-root versus potted ponderosa pine planting stock at one site in south-central Nebraska.

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Methods

The study site is 3 miles east of Hastings, Nebraska on open, level land of uniform silty-clay-loam soil. Mean annual precipitation is 26.6 inches. In the year prior to the first trial (1974), annual precipitation was 8.32 inches below normal. During the first year (1975), precipitation was normal or better during April through July, but was deficient thereafter. Every month in 1976, except April, had below-normal precipitation.

Two field tests were made. In April 1975, 58 bare-root, 2+0 ponderosa pine seedlings of Niobrara, Nebraska seed source grown at Bessey Nursery, and 58 container-grown (Spencer-Lemaire) 9-month-old ponderosa pine seedlings of Rosebud, South Dakota seed source grown in a greenhouse at Bottineau, North Dakota were alternately planted by machine 6 feet apart in a single row. Trees were removed from the container just before planting. Survival and height data were recorded in spring and fall 1976.

In May 1976, 26 bare-root, 2+0 ponderosa pine seedlings were alternately planted by hand 5 feet apart with 26 potted, 2+1 ponderosa pine seedlings.² Both bare-root and potted trees were of San Isabel National Forest, Colorado seed source, and were grown at the Colorado State Forest Service nursery at Ft. Collins, Colorado. Tarpaper pots were removed just before planting. Survival and height were measured after the first growing season, in fall 1976. Both plots were maintained by annual application of Simazine 80W (4 lbs /acre) and periodic mowing to reduce grass competition. Survival data were subjected to a chi-square test to determine whether differences were significant.

Results and Discussion

Survival was high in both plantings despite below-normal precipitation during the growing seasons. After a full year, 98% of the container-grown seedlings were alive compared to 95% of the bare-root seedlings. Heights of bare-root stock averaged 0.67 foot and container-grown

stock 0.43 foot after one growing season. During the second season there was no mortality, and the container stock outgrew the bare-root stock, thus narrowing the difference in average height — 0.82 foot for container-grown seedlings; 0.99 foot for bare-root.

In the second test after one growing season, all of the potted seedlings and 88% of the bare-root seedlings were alive. First-year average heights were identical — 0.63 foot.

In summary, the differences in survival of bare-root versus container-grown and bare-root versus potted seedling planted in south-central Nebraska were not significant at the 0.05 level. Container-grown seedlings grew faster than bare-root stock during the second season, however.

Literature Cited

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²Bare-root seedlings were lifted at age 2, transplanted in soil in tarpaper pots, and grown in a shadehouse for a year.

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